

WARWOOD TOOL COMPANY
Foot of 19th Street
Wheeling
Ohio County
West Virginia

HAER NO. WV-48

HAER
WV4,
35-WHEEL,
39-

PHOTOGRAPHS AND
WRITTEN HISTORICAL AND DESCRIPTIVE DATA
REDUCED COPIES OF MEASURED DRAWINGS

Historic American Engineering Record
National Park Service
Department of the Interior
Washington, D.C. 20013-7127

HISTORIC AMERICAN ENGINEERING RECORD

WARWOOD TOOL COMPANY

HAER NO. WV-48

HAER
WVA,
35-WHEEL
39-

Location:

Foot of 19th Street, Wheeling (Warwood),
Ohio County, West Virginia.

Quadrangle: Wheeling, West Virginia-
Ohio. UTM: A. 17.525260.4440810 B.
17.525270.4440690 C. 17.525260.4440695
D. 17.525220.4440800

Date of Construction:

1905.

Present Owner:

Warwood Tool Company; Robert J. Burke,
President (20%), Mrs. Robert J.
(Delores) Burke (30%), James J. Haranzo,
Secretary-Treasurer (20%), Mrs. James J.
(Kathy) Haranzo (30%).

Present Use:

Still in operation.

Significance:

The Warwood Tool Company makes hand
tools using labor intensive forging
operations, that transform raw steel
into finished tools. These forging
operations are the same as used when the
company began productions during the
middle part of the 19th century.
Warwood makes a variety of tools
including garden tools, track tools,
hammers, mauls, picks and other tools.

Prepared by: Lee R. Maddex
Historian
Historic American
Engineering Record
August 1990.

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Introduction

The Warwood Tool Company, established in 1854, still makes forged hand tools much the same way they did a hundred years ago. This is remarkable in an age of mechanized tool production. Thus, this study is an attempt to document this now uncommon process. The first section of the report, entitled "The History of the Warwood Tool Company," will examine the company's institution history. Since the Warwood Tool Company has existed quietly and has not been given the attention the other Wheeling industries have, very little written history of the company exists. This is reflected in the brevity of the first section of this narrative. The second section of this narrative is entitled "Warwood Tool Operations" and is intended to familiarize the reader with the processes and tools used to make Warwood tools. The third section of this narrative is called "Tool Manufacturing Processes" and is a case study examining the manufacturing of three of Warwood's more popular tools. These particular tools were also chosen because their manufacture requires the operations discussed in the previous section. The appendix is a complete listing of the presses, hammers and other tools used at Warwood. It is important that these machines be documented as many of these tools are original and may be replaced in the near future by modern machinery as Warwood Tool upgrades its forge

shop. In conclusion, special thanks must be given to Robert Burke, president of Warwood Tool for all the help supplied in creating this document.

The History of the Warwood Tool Company

Henry Warwood, founder of the Warwood Tool Company,¹ was born in Staffordshire, England in 1823. Warwood learned the art of making miner's tools and garden implements while employed by Brade and Company at their steel works near Birmingham, England. Warwood emigrated to the United States in 1848, settling first in Cuyahoga Falls, Ohio. Shortly afterwards, Warwood moved to the Pittsburgh area of Pennsylvania where he was employed in the manufacture of forks. Henry then made tools at several locations in the Pittsburgh area over the next couple years.²

Henry Warwood returned to Ohio in 1854, settling in Martin's Ferry. Here, he paid John Wallace \$300 for lot No. 52 in Wallace's Addition in March 1854,³ where he established a shop on the corner of Fourth and Locust streets. Already extant on the lot were tin and blacksmith shops. Warwood transformed the tin shop in to his home and used the blacksmith shop to make wrought iron rakes, hoes and miners' tools.⁴

By the late 1860s, Warwood's business had already outgrown its manufacturing facilities.⁵ Thus, in May 1867, Warwood bought two lots on the Ohio River from John McCloskey for \$2,200.⁶

Warwood's new factory was located on First Street (Front Street) and Walnut Street (Cadiz Road).⁷ The factory, completed by 1868, featured steam powered trip hammer, a combined shear, punch and press and other tool-making machinery. The principally products of this new foactory were miners' tools such as sledges, picks and wedges. In addition, Warwood also specialized in making garden rakes which were reportedly of the highest quality and widely sold.⁸

The Warwood Tool Company remained in Martins Ferry until January of 1892 when the company was sold following Henry Warwood's retirement. It was purchased by Daniel L. Heiskell l⁹ and relocated it to Wheeling, West Virginia.¹⁰ Warwood Tool moved into the factory formerly occupied by the Standard Axle Manufacture Company. This was lot 65, located on McColloch Street in Caldwell's Addition, just east of the La Belle Iron Works. The purchase price was \$2,250.¹¹

The Warwood Tool Company was incorporated by the State of West Virginia on May 14, 1892. The scheduled fifty-year incorporation was for the express "purpose of manufacturing and selling coal miners tools, agricultural tools and implements, and hardware specialties; and doing a general manufacturing business..." Warwood was capitalized with \$12,500 of stock, with the "privilege" of increasing capitalization to a maximum of \$100,000. The Warwood Tool Company incorporators were Daniel L.

Heiskell, Florence Maude Heiskell (his wife, nee Eccles), S.J. Eccles, William P. Burke, and H.T. Collins.¹²

In September of the same year Heiskell "sold" Warwood Tool to B. Walker Peterson¹³ and associates for the sum of \$10,000 for "all engines, boilers, machinery, tools, stock and other personal property."¹⁴ The Wheeling City Directory for 1892-93 lists the company under the heading of the Warwood Tool Works and manufacturing picks, etc, with Heiskell as president.¹⁵ The directory Supplement for 1893, lists the company under the heading of the Warwood Tool Company with Daniel Heiskell still president. Evidently, Heiskell remained involved with running the company following the sale to B. Walker Peterson. Warwood Tool is listed as manufacturing "mining, farming and track tools."¹⁶

Between 1893 and 1896, Warwood Tool had moved its factory and office to Market Street, between 28th and 29th streets.¹⁷ Warwood Tool was then making coal miners' tools, picks, mattocks, grubbing tools, sledge hammers, crow bars, various wedges, and the like.¹⁸ The new Warwood Tool factory was laid out in three wings: the first wing was the tool shop where tools were forged; the second wing was the tool finishing shop; and the third wing housed tool painting, tool packing and the plant office.¹⁹ It is unclear exactly what kind of machinery was used at this location. The 1902 Sanborn Insurance Map does reveal the existence of

grinders, a tumbler (presumably for tool cleaning prior to finishing) and heaters. The heaters were probably furnaces used to heat stock prior to forging operations. Warwood Tool continued operations at this location until shortly after the turn of the century.

During the fall 1903 and spring 1904, the Warwood Tool Company began purchasing land north of Wheeling along the Ohio River near Glenn's Run. (Originally, the Warwood area was used for truck gardening, growing vegetables for local markets. The lands had been owned by Alexander and Thomas Garden, Jacob Lasch, John Stenger, Chauncy Dewey and John Culbertson.²⁰) The first parcel was purchased in September, and the second and third parcels purchased in March of 1904.²¹ The land acquired was used to establish the new Warwood Tool Company factory and a company town on its current site.

The Warwood Tool Company's new factory began operations in 1905.²² The town of Warwood which took its name from the company, grew up around the factory. Interestingly, Walker Peterson, Warwood Tool's president, attempted to promote the growth of the town by granted public access to all of the company town's roads, avenues and lanes in 1905.²³ In addition, Warwood Tool subsidized the building of a water works which furnished water for town of Warwood.²⁴

In 1916, Warwood expanded its line of coal miners' tools with the addition of a machine which could twist bar metal into coal augers up to ten feet in length. Additionally, Warwood made a whole line of mining machine bits. These bits were sold unhardened. Tempering was to be done in the field, to meet local conditions. During the 1920s, Warwood offered many tools other than those used in the coal mines. Some of these tools included crow bars, mauls, wrecking bars, sledge hammers, mattocks, picks, garden tools and many others.²⁵

In about 1922, Warwood Tool added a quality control department to test steel bars and other raw materials for flaws as well as finished products.²⁶

In 1942, Warwood's charter was amended to "to manufacture, sell and deal in tools, implements, machine, machine parts, and forgings and generally, and without limitation...to manufacture, process, compound, assemble, buy, sell, lease or otherwise acquire, hold, use and dispose of any and all manner of devices, products, mechanical appliances, compound, article of mechanism, materials and supplies." Additionally, capital stock was increased to \$200,000 at 2,000 shares of \$100 each. The amended charter was to be perpetual.²⁷

Today the Warwood Tool Company still makes virtually the same tools they did eighty-five years ago, when they moved to Warwood. Thirteen tools account for seventy-five percent of

Warwood's tool production. Namely, the No. 1 Cutter Mattock, No. 2 Pick Mattock, No. 30 Railroad Clay Pick, No. 80 Square Head Wedge, No. 85 Oregon Splitting Wedge, No. H-121 Wood Choppers Maul, No. H-124 Short Hand Drilling Hammer, No. H-126 Short Striking Hammer, No. H-127 Long Striking Hammer, No. H-134 Double Face Sledge, No. 161 Wedge Point Crow Bar, No. 165 Post Hole Digger and Tamping Bar, and No. 166 Warwood Standard Wrecking Bar. All of these tools come in various weights, although some weights are more popular than others. (For example, the eight pound sledge outsells the sixteen pound sledge). Warwood is capable of making more than 400 tools with a system of interchangeable dies.²⁸ Warwood makes many other tools, including adzes, tongs, chisels, drift pins, and punches, and garden tools such as hoes.²⁹

The Warwood Tool factory has changed very little since 1905. The factory is laid out on a rectangular plan with the raw materials entering the southern end of the plant, the forging operations on the central floor of the factory, and finishing operations including painting, boxing, and shipping in the northern end. The factory office is also located in the northern end.³⁰ The only major change to the factory was the replacement of the lineshaft system which powered the machines with individual motors for each machine. Another interesting feature of the early factory was the isolated electric plant (basically a

very large electric generator) which furnished electricity for the tool company. Now Wheeling Power furnishes the plant with electricity.³¹

The operations involved in making tools are still very labor intensive. Forgings are hand loaded into the heating furnaces, hand carried from the furnaces to the forge and hand manipulated in the forging operations. This is also true for heat treating, inspection and finishing operations.

Eventually, Warwood Tool will change from forging tools with drop and tilt hammers to high speed hydraulic presses, but it will be some time before this will occur.³²

Warwood Tool Operations

1. **Materials:** Raw materials arrive at southern end of plant and are stored there until needed. Primarily plain high carbon C-1060 steel rectangular and square bars and round rods are used for tools. Silicon-Manganese 9260 alloy steel is used for making certain types of tools. (The classification of steel is based on the carbon content and other alloying elements. For example, C-1060 steel is 0.55% to 0.65% carbon, and 0.60 to 0.90 manganese. 9260 alloy steel is also 0.56% to 0.64% carbon, and also contains 1.80% to 2.20% silicon (silicon is the major ingredient for the deeper hardenability of alloy tools) and 0.75% to 1.0% manganese which give the steel special qualities. In this case, 9260 alloy

steel attains a greater depth of heat treatment.³³) Steel is unloaded from trucks on the east side of the building by a crane. The crane loads the steel into bins in the center of the floor. From here the steel bars and rods are conveyed to the shears by a set of rollers. Typically, the steel bars and rods arrive in twenty to thirty foot lengths.³⁴

2. **Shear:** Steel stock is sheared to proper length with allowances for forging operations. The sheared steel stock is loaded into tote boxes for transit to other points in the forge shop.³⁵

3. **Furnaces:** The steel stock is heated in a furnace to 2,000 degrees Fahrenheit or forging temperature prior to forging operations. The furnaces are fired by natural gas and vary in size with some having only a single bay while others have two or three bays. All furnaces are of the slotted type design.³⁶

4. **Forging operations:** Warwood Tool uses four basic forges for its various forging operations. They are as follows:

A. **Upsetter:** The upsetter is a hydraulic press used to hot forge bulbs on the end of the steel stock where additional metal is needed for subsequent forging operations. Generally, the maximum forgeable upset is two to three times the diameter of the steel stock. This process is similar to the one used to head nails.³⁷ Warwood uses a two inch Acme Upsetter.³⁸

B. Tilt hammer: Tilt hammers are a mechanical form of the blacksmith's hammer. Historically, the tilt hammer was used to drive slag from wrought iron blooms (elongated iron bars) and form iron plate. At Warwood the Bradley Tilt Hammers are used to form the ends of many types of tools. Tilt hammers were often water powered. The Bradley Tilt Hammers are driven by electric motors.

C. Drop hammer: Drop hammers forge metal by using gravity. The weight of the hammer forms the metal. Drop hammers are of a very ancient origin. Steam hammers on the other hand, were developed in the early 1800s by Englishman James Nasmyth. Nasmyth's hammers were steam operated and could be controlled very precisely. Warwood uses gravity drop or board hammers and have an electric motor powered roller to raise the hammer. Warwood hammers have wooden shafts (i.e. board hammers), which lessen the vibrations caused by the forging operations.

The drop and tilt hammers are used for two basic forging operations: rough and finish forging. The process of rough forging transforms the steel stock into the shape of the tool being made. This is usually a two pass process: the first is a breakdown pass and the second an impression pass. The rough shape is the result of the dies used in the forging operation. These dies are known as simple closed

dies. The cavities of the dies are in the shape of the tool being made. The heated metal is deformed into the shape of the tool when the hammer drops. The lower die is fixed and the upper die moves.³⁹ Finish forging shapes the rough piece into the final recognizable form. This is done with a series of passes, both with closed impression dies. The mattock and curved tools usually require this two stage forging operation. However, some forging operations do not require both of these stages, but rather use only the breakdown and impression passes. For example, the manufacture of sledge hammers is a single stage process. Forging of tools is important because it refines the steel by tightening the grain, distributing inclusions and other impurities throughout the steel and toughens the steel.⁴⁰

D. Bar roller: The bar roller reduces the diameter of bar stock through a series of decreasing roll grooves. Unlike the conventional rolling mill, these rolls only rotate through a short distance and then reverse. Steel bar diameters are reduced by offering the steel bar into these series of grooves, backing the roller off and repeating until the desired diameter is reached.

5. Trim press: The trim press performs three operations at once. First, it is used to remove the flash or feathering which is extruded from between the dies used in drop forging.

Secondly, it finish forges the eye in tools requiring handles. Lastly, it stamps the tool with the warnings about tool misuse, country of origin and the Warwood name. Typically, this operation immediately follows the drop forging operation, because the tool must still be at forging temperature.

6. Shot blasting: Shot blasting of tools is required to remove scale build up on the tool in preparation for heat treating and painting. The tool is tumbled and bombarded with lead shot, which removes the scale. Scale is formed on the tools during the heating and forging operations.

7. Grinding: The grinding of tools is to remove rough edges and smooth the surface of the tool. In addition, the tool is ground to reduce stresses within the tool body under impact. Grinding of bevels on tools must meet specifications set by the American National Standards Institute, Inc (A.N.S.I.) and the American Railway Engineering Association (A.R.E.A.).⁴¹

8. Heat treatment: Tools made of alloy steel are heat treated (heat treating is the changing of the physical properties of steel by heating and cooling operations) in an open box furnace. Heat treatment is affected by heating the tool face to 2,000 degrees Fahrenheit and then quenching or rapidly cooling it by immersion in water or molten lead. This fixes or freezes the steels hardness in a fixed range (see inspection). High carbon steel tools are heat treated using the Ajax Induction Heat

Treater. Tools are heat treated by passing an electric current through it, followed by quenching. This machine heat treats tools at a rate of one per minute or approximately 60 to 100 units per hour. The Ajax machine attains heat treatment to a depth of one quarter inch and the open box furnace, heat treatment to a depth of one-half inch. The Ajax Induction Heat Treater is an universal heat treating system but for convenience it is set up to heat treat plain carbon steel.⁴²

9. **Inspection:** The tools are inspected for defects. The tools are first subjected to material hardness tests using two types of non-destructive testing: Rockwell and Brinell. The tool face is given a Rockwell "C" Hardness Test. In the Rockwell "C" test, a diamond penetrator with a 331 pound load impacts the tool face. The amount of penetration determines the materials hardness. If the penetration is too great then the steel is too soft and if the penetration is too shallow the steel is too hard. The Rockwell test is used on smooth flat surfaces. Tool sides are subjected to the Brinell Hardness Test. This test is similar to the Rockwell test, but the penetrator is 10,000 millimeter ball with a 3,000 kilogram load. Like the Rockwell test, the penetration determines the steels hardness.⁴³ Railway Striking Tools, under current railway specifications, must have a hardness of 51-55 Rockwell "C". All other striking tools must have a hardness of 45-60 Rockwell "C".⁴⁴ Picks, Mattocks, and bars call

for a slightly lower hardness. If a tool fails the hardness test, it is rejected. If the tool passes, then it must be tested by magnetic particle inspection.

In magnetic particle testing, the tool is placed in a magnetic field, sprinkled with ferromagnetic powder and any imperfections or cracks will show up under a ultraviolet light.⁴⁵ In most cases a random sample of tools is tested. However in the case, of railroad tools, every tool is tested. Each tool must meet A.R.E.A. specifications. However, tools such as wrecking bars or crow bars are not subjected to magnetic particle inspection, because these tools are not designed to be used as impact tools (like hammers).

10. Painting: Most tools will be painted Warwood Blue (a very dark shade of blue). Those tools made from alloys, however, are painted red. Garden tools, although not made of alloy steel, are also painted red. Some tools are not painted at all, such as current AREA Grade B Alloy striking and struck tools. Painting of tools is done with a conveyor system which dips the tool and then slowly conveys the tool until the paint has dried. There are three lines: one for red paint, one for blue paint and a hand dip line for either red or blue paint. Following painting, tools with faces, such as hammers, have the striking faces polished.⁴⁶ Warwood uses a water based paint, but formerly used a lacquer based paint.

11. **Handles:** Handles are then attached if required. The handle is inserted in the tool, the wedge placed and set, and the waste wood sawed off. Hickory handles are used for hammers and picks, and ash handles are used for garden tools. Warwood also offers fiberglass handled striking tools.

12. **Packaging and shipping:** Packaging of the tools and shipping are the final stages of the tool making process. Warwood tools are shipped to points across the globe, as well as the United States, Canada and Puerto Rico. Many track tools are sold to the major American and Canadian Railroads. Warwood Tool hopes to exploit the market created in Eastern Europe because of the recent political changes.⁴⁷

13. **Machine shop:** Warwood is equipped with its own machine shop. The shop makes and repairs dies. The dies wear quickly (after 10,000 units or between 30,000 and 40,000 blows) and need to be reground to bring them back into the correct tolerance. When the die can no longer be reground, then a new die has to be fabricated from a block of steel. The longevity of the dies depends on the product being forged and, particularly, the type of steel being used. The eight pound sledge hammer uses three or four sets of dies per year because it sells well. The sixteen pound sledge wears dies out on a rate of one set every four or five years, because sales are fewer. Alloy steel wears the dies more quickly, than does plain carbon steel.⁴⁸ Machine shop tools

at Warwood include lathes, planers, milling machines, and shapers.

Tool Manufacturing Processes

The following section is a case study, giving a detailed account of how three tools are manufactured by the Warwood Tool Company. These three tools were chosen because the manufacturing processes involved use the operations previously discussed. Specific size tools are indicated, but the operations are typical for any size of that tool. See the Warwood Tool catalog of Fast Moving Items for specific tool illustrations (Field Records).⁴⁹

A. No. H-134 Three Pound Sledge Hammer: The manufacturing of the sledge hammer begins with the shearing of a double billet from the steel bar stock. The extra length provides a grip for the forge operator during the forging operations, and the double billet makes two hammer heads. The billet is then heated to forging temperature and moved to the drop hammer. The operator holds one end of the hot billet with tongs and the other end is forged with a breakdown pass. The stock is flipped and the other end forged. This process is repeated on both ends with two impression passes for each end. Following these operations, while still at forging temperature, the sledge hammer is placed in the trimming press where the flash is removed, the eye finished forged, and the tool is stamped with the warning and

Warwood name. The sledge head is then slow cooled to room temperature. Following cooling the tool face is contoured to meet A.N.S.I. or A.R.E.A. specifications. The sledge head is then shot blasted to remove any scale. After shot blasting, it is heat treated in accordance with the type of steel used and hardness desired. After this, the sledge hammer tool faces and sides are tested for hardness and subjected to magnetic particle inspection. From here, the sledge is taken to the painting section where it is painted and the striking faces polished. The sledge hammer is then assembled with a handle, if required, and is ready for packing and shipping.

B. No. 160 Twelve Pound Pinch Point Crow Bar: The first step in manufacturing the pinch point crow bar is to shear a section of one-and-one-half inch, rounded corner, square bar steel to the correct length. The grip end is heated to forging temperature and is offered into the bar roller. Here the grip end of bar is simultaneously rolled octagonal in the center section and round on the end. The next operation is to forge the heated point end. This can be done with either the Bradley Tilt Hammer for small production runs or the drop hammer for large production runs. After cooling, the crow bar faces are ground to remove any forge overlaps and to finish the point end. The point end is then heat treated in the open box furnace. The sides of the point end are subjected to the Brinell hardness test only.

The crow bar is then painted by hand dipped method and hung upright to dry. After these operations, the pinch point crow bar is ready for packing and shipping.

C. No. 165 Seventeen Pound Post Hole Digger: The manufacturing of the post hole digger begins with the shearing of a section of one inch diameter, plain, high carbon steel to the correct length. The tamper end of the bar is heated to forging temperature and the finished knob forged with the upsetter. The blade end is then heated to forging temperature and a cone of upset steel forged with the upsetter. The cone is reheated and the blade forged with the drop hammer. This is done with two passes and then the flash is removed with the trimming press. Following cooling, the post hole digger is ready for finish grinding. The tamper end is touched up to remove any burrs, the blade end sharpened and any sharp edges ground off. The blade is then heat treated in the open box furnace. Next, the blade face is subjected to the Brinell Hardness Test. The post hole digger is hand dip painted and hung vertically to dry. After painting the post hole digger is ready for packing and shipping.

Appendix

The following is a list of tools used forging and finishing of the tools made by Warwood Tool. The citations are incomplete in the cases where the labels are worn or otherwise unidentifiable on the machines themselves. The word idle indicates that the machine is not presently being used. The numbers refer to the machine locations on the attached Warwood Tool floor plan.

1. Bliss Press-Housing Only
2. Bliss Consolidated No. 6 Press-Housing and Gearing Only
E.W. Bliss
Brooklyn, NY USA
Hastings Works
3. Thomas Press-Idle
Thomas Machine Co.
Pittsburgh, Pa
4. Bliss Press
No. 75 1/2
E.W Bliss
Brooklyn, NY USA
5. 2 Inch Upsetter
Ajax Manufacturing Co.
Cleveland, Ohio
6. Shear
Cleveland Punch and Shear Works Co. USA
7. Shear
The Motch and Merryweather Machinery Co.
Cleveland, Detroit, Cincinnati, Pittsburgh
8. Press-Idle
9. Thomas Press-Idle
No. 75s-48-D
Thomas Machine Company
Pittsburgh, Pa USA

10. Drop Hammer-Idle
AL 8638-3
No Name
11. Bliss Trim Press
No. 75 1/2
E.W. Bliss
Brooklyn, NY USA
12. Drop Hammer
Chambersburg Engineering Co.
Chambersburg, Pa USA
Brass Tag 1840 (SN?)
13. Bar Roll Forge-Idle
No Name
14. Bradley Helve Hammer
100 lb. No. 1927
Syracuse, NY
With brass plate: "From Manning, Maxwell and Moore
Railway and Machinist Tools and Supplies, New York and
Chicago" and additional Tag No. 117.
15. Toledo Press
No. 5A
Toledo Machine and Tool Co.
Toledo, Ohio
16. Niagara Press
A4
Niagara Machine and Tool Work
Buffalo, NY USA
17. Hamilton Drop Hammer-Idle
No 487 5/8
18. Press
No Name
19. Bradley Helve Hammer
100 lb. No. 1928
Syracuse, NY
Same plate without extra number
20. Bradley Helve Hammer
Syracuse, NY

21. Niagara Press
A3 1/2
Niagara Machine and Tool Works
Buffalo, NY USA
22. Bradley Helve Hammer
100 lb. No. 3295
Syracuse, NY
No plate, no extra number
23. Press
No Name
24. Eye Press
A Garrison Foundry Co.
25. Trim Press
No Name
26. Press
No Name
27. Drop Hammer
9353-3 (cast into housing)
Chambersburg Engineering Co.
Chambersburg, Pa
28. Bliss Press-Idle
29. Niagara Trim Press
A5
Niagara Machine and Tool Works
Buffalo, NY USA
30. Bliss Press
No. 306 1/2
E.W. Bliss Toledo Machine and Tool Division
Toledo, Ohio USA
31. Bliss Press
No. 8A
Housing Stamped: 3797
80009
1922
E.W. Bliss
Brooklyn, NY USA
- 31a. Press
Bliss and Williams

Brooklyn, NY
Pat'd Jan 26-68
R??'d Dec 31-68
Pat'd Dec 27-70

32. Drop Hammer
Chambersburg Engineering Co.
Chambersburg, Pa
33. Thomas Press
No. 75s-48D
Thomas Machine Co.
Pittsburgh, Pa USA
34. Rockford Press-Idle
5 1/2-72
35. Ajax Bar Roll Forge
Machine No. 4575 Size No. 2
The Ajax Manufacturing Co.
Cleveland, Ohio USA
36. US Industries Press
Torc-Pac 60, SN 57-8914
US Industries Inc.
USI Clearing
37. Grinder/Brush
No. 12
Chas FL Hommedieu and Sons
Chicago, Ill
- 38./39. Molten Lead Quencher
40. Erie Drop Hammer
41. Bliss Trim Press
42. Open Box Furnace
43. Furnace
- 44./45. Wheelbrator-Frye Shot Peener
Wheelbrator-Frye, Inc.
Materials Cleaning Systems Division
Mishawaka, Indiana USA
46. Press-Idle
No Name

- 47. Acme Polisher
Acme Manufacturing Co.
Detroit, MI USA
- 48. Grinder
No Name
- 49. Grinder
No Name
- 50. Dust Accumulator
No Name
- 51. Grinder
No Name
- 52. Norton Grinder
Type-S SN VLS 129
- 53. Grinder
No Name
- 54. Norton Grinder
Type-S
- 55. Press-Idle
No Name

ENDNOTES

1. It is unclear whether Henry Warwood called his factory the Warwood Tool Company, the Warwood Tool Works, or neither of these names. For purposes of continuity, it will be called the Warwood Tool Company, unless otherwise noted.

2. J.A. Caldwell, History of Belmont and Jefferson Counties, Ohio, and Incidentally Historical Collections Pertaining to Border Warfare and Early Settlement of the Adjacent Portion of the Ohio Valley (Wheeling, W.Va.: Historical Publishing Co., 1880), p. 305.

3. Deed Records No. 38, Belmont County, Ohio, p. 385. Belmont County Clerk's Office, County Courthouse, St. Clairsville, Ohio.

4. Caldwell, History of Belmont And Jefferson Counties, pp. 294-95.
5. In April 1864, Warwood purchased lots 61 and 62 in Martinsville, Ohio (now Martins Ferry) for \$400.00 (see Deed Records Vol. 49, Belmont County, Ohio, p. 488). Warwood sold these lots in March 1865 (see Deed Records Vol. 51, Belmont County, p. 331). Apparently Warwood had plans to expand at this time, but did not.
6. Deed Records No. 53, Belmont County, Ohio, p. 493.
7. Caldwell, History of Belmont and Jefferson Counties, p. 305.
8. Ibid, p. 295.
9. City directories reveal that Daniel L. Heiskell was employed at many different jobs during his short life. Heiskell died in 1895 at the age of 34 (see Records of Death, Ohio County, Vol 5, p. 304 County Clerks office, Wheeling, West Virginia). Before purchasing the Warwood Tool Company, he was employed as a salesman for the Wheeling Soap Company; part owner of Heiskell and Vardy, a chemical company; later a salesman for the Junction Iron Company. Heiskell married Florence M. Eccles in 1889 (see Marriage License Vol. 19, Ohio County, p. 169, County Clerks Office, Wheeling, West Virginia).
10. "Warwood Tool Company," Heat Treating and Forging, February 1929, p. 1. From off print of article furnished by Robert Burke, president of the Warwood Tool Company.
11. Ohio County Deed Book No. 88, p. 171. City-County Building, Wheeling, West Virginia.
12. Certificate of Incorporation/ Power of Attorney Volume 2, Ohio County, p. 562.
13. B. Walker Peterson was a local Wheeling businessman. He was also president of the Dollar Savings and Trust Company and vice-president of the Wheeling Traction Company (see Callin's Wheeling City Directory 1907-09, p. 472). Peterson was born in 1851 and died in 1925 (see Records of Death, Ohio County Vol 57, p. 12, County Clerks Office, Wheeling, West Virginia).
14. Ohio County Deed Book No. 89, p. 206.
15. Callin's Wheeling City Directory for 1892-93 (Wheeling, W. Va.: Commercial Printing House, 1892), p. 457.
16. Supplement for 1893 Callin's Wheeling City Directory (Wheeling, W.Va.: Commercial Printing House, 1893), p. 124.

17. There are no deed records which document the change in plant locations. The property on which Warwood relocated was owned by the Baltimore and Ohio Railroad. (See Deed Book No. 47, p. 224. Or see Wheeling City Maps for 1889 and 1901 located in the County Clerks Office.) It is most likely, that Warwood Tool rented the property. Deed records indicate that the same general property was rented by the J.E. Moss Iron Works in 1916 for a period of five years. (see Deed Book No. 153, p. 245) Clearly the title for the property Warwood Tool located on did not change hands. Additionally George McMechen and Sons food packing plant was located adjacent to the Warwood plant. Deed records show McMechen won a suit against the B&O and were granted title to the land (see Deed Book No. 100, p. 224). Additionally, the Ohio County Land Books for the 1890s have no entries for Warwood Tool. However, this is very odd, for it would be unlikely that the B&O would pay the property taxes associated with the Warwood shop. The 1896 date comes from the Wheeling City Directory of 1896, available at the Wheeling Room at the Ohio County Library, Wheeling, West Virginia.

18. William Callin, Wheeling City Directory 1896 (Pittsburg, Penn.: William G. Johnson and Co., 1895), p. 563.

19. Wheeling Sanborn Fire Insurance Map 1902, p. 43.

20. Blanche D. Steenrod, "Pot-pourri," Wheeling News-Register, n.d. Furnished by Margaret Brennan of the Wheeling Historical Society.

21. Ohio County Deed Book No. 113, pp. 50 and 391. Ohio County Deed Book No. 114, pp. 550-51.

22. Land Book No. 2 1905 Country District, Ohio County, Richland Assessment District, p. 67. The 1905 Land Book shows an increase in property values for the Warwood site. In 1903 and 1904 the total property value is listed as \$4,300 (see Land Books for 1903 and 1904, Richland Assessment District pp. 50 and 62 respectively). In 1905, The property value jumped to \$18,500, clearly indicating major improvements to the property. Further the Callin's Wheeling City Directory 1904-05 p. 652, states after 1 January 1905 Warwood Tool would be located at Warwood, West Virginia. This contradicts the 1907 date given in the "Warwood Tool Company" article in Heat Treating and Forging.

23. Plat Book No. 1, "Second Section of Plat Of Warwood Ohio County, West Virginia," p. 106B.

24. "Warwood Tool Company," p. 1. Jim Haranzo, Secretary-Treasurer of Warwood Tool stated that during the early years at Warwood, the water works kept the too company afloat. From conversation 31 July 1990.

25. "Warwood Tool Company," p. 1.
26. Ibid, p. 3.
27. Certificate of Incorporation/ Power of Attorney Vol. 21 Ohio County, p. 167.
28. Interview with Robert Burke, 3 August 1990. Robert Burke is president of the Warwood Tool Company. Also see Warwood Forged Tools; Fast Moving Items (n.p., n.d.), pp. 1-3.
29. Warwood Tool Company Catalog No. 87 (n.p., 1989), pp. 1-18.
30. Wheeling Sanborn Insurance Map for 1922, Vol. 2, pp. 110-11.
31. "Warwood Tool Co.," p. 2.
32. Burke, 3 August 1990.
33. B.H. Amstead, Manufacturing Processes (New York: John Wiley and Sons, 1977), pp. 56-57.
34. Burke, 3 August 1990.
35. "Warwood Tool Company," p. 2.
36. Ibid, p. 2.
37. Manufacturing Processes, p.344.
38. Burke, 3 August 1990.
39. Manufacturing Processes, pp. 339-44, p. 412.
40. Manufacturing Processes, p. 335.
41. Burke, 3 August 1990.
42. Burke, 3 August 1990.
43. Manufacturing Processes, p. 33.
44. Burke, 3 August 1990.
45. Amstead, Manufacturing Processes, pp. 326-27.
46. Burke, 3 August 1990.
47. Burke, 3 August 1990.

48. Burke, 3 August 1990.

49. The case study is based on information furnished by Robert Burke during conversations 3 August and 8 August 1990. Additional information was derived from production phase sheets, which document the operations a tool under goes during manufacture. These were also furnished by Robert Burke.

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PROJECT INFORMATION

The Historic Wheeling Recording Project was undertaken during the summer of 1990 by the Historic American Buildings Survey/Historic American Engineering Record (HABS/HAER), Robert J. Kapsch, chief, Division of the National Park Service. The funding was supplied by West Virginia University through the Institute for the History of Technology and Industrial Archeology, Emory L. Kemp, director. Local sponsorship was provided by and the Victorian Wheeling Landmarks Foundation, Betty Nutting, Bill Fields and Frances Williams, principals. The project was supervised by Paul Dolinsky, chief of HABS, Joseph Balachowski, architect and Catherine C. Lavoie, historian. For West Virginia University, the principals were Emory L. Kemp, director and Billy Joe Peyton, historian. The large format photography was the work of HABS photographer, Jack E. Boucher.

The documentation was produced in the HABS/HAER Field Office, Wheeling, West Virginia in 1990 by Professor John P. White, Supervisory Architect, Texas Tech University; Architectural Technicians Joelynn Barclay, University of Texas at Arlington; Titiana Begelman, Columbia University; Steven C. Byington, Texas Tech University; Lazlo A. Darago, Technical University of Budapest (US-ICOMOS, Hungary); Harold E. Phelps III, University of Southern California; Mark A. Radven, Texas Tech University; Historians Arlene R. Kriv, Rutgers University; and Lee R. Maddex, West Virginia University.

ADDENDUM TO:
WARWOOD TOOL COMPANY
Foot of Nineteenth Street
Wheeling
Ohio County
West Virginia

HAER WV-48
WVA, 35-WHEEL, 39-

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